

REMARKS

Reexamination and reconsideration in light of the foregoing amendments to claims 1 and 2 and the following remarks is respectfully requested. Applicant notes the Examiner's acknowledgment of Applicant's claim for foreign priority under 35 U.S.C. § 119 and receipt of the certified priority document.

Claims 1-13 are pending in this application. Claims 4-13 have been withdrawn from consideration due to a restriction requirement. No new claims have been added.

Rejection Under 35 U.S.C. § 112

Claims 1-3 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite because the phrase "the impurities" lacks antecedent basis. Claims 1 and 2 have been amended to add the expression --having impurities-- to claim 1, line 4 and claim 2, line 4 after "copper carbonate powder." Support for the added expression can be found in claims 1 and 2 where the claims refer to "the impurities" as being "included in the basic copper carbonate powder." Accordingly, it is believed that the amendments to claims 1 and 2 would obviate the rejection. It is respectfully requested that the rejection under the second paragraph of 35 U.S.C. § 112 be reconsidered and withdrawn.

Rejection of Claim 1 Under 35 U.S.C. § 103(a)

Claim 1 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Bartley (U.S. Patent No. 4,677,234) in combination with Okada et al. (U.S. Patent No. 6,218,335) and Fernandez et al. (U.S. Patent No. 5,449,845). According to the Examiner, "Bartley teaches a method for manufacturing a copper electroplating material adapted to be fed as a copper ion supply to a copper

Application No.: 09/944,344

plating bath in copper electroplating comprising the step of: heating basic copper carbonate powder (col. 6, lines 59-62) to a temperature of 250°C to 800°C (= from about 200°C to about 500°C) [col. 7, lines 40-46] in an atmosphere which is not rendered reductive to carry out thermal decomposition of the basic copper carbonate (= calcination involves high temperature heating under oxidizing conditions so that the carbonate is decomposed and the volatile material is expelled) [col. 7, lines 33-40], to thereby produce easily dissolved copper oxide power (= conversion of carbon carbonate to copper oxide) [col. 7, lines 43-44].” Applicant respectfully disagrees with the Examiner’s characterization of the teachings of the reference.

Claim 1 is directed to a method for manufacturing a copper electroplating material adapted to be fed as a copper ion supply to a copper plating bath in copper electroplating. Bartley discloses a process for the preparation of ethylene glycol by a vapor phase catalytic hydrogenation of at least one di(lower alkyl)oxalate and alkyl glycolate in the presence of a copper hydrogenation catalyst. The catalyst is prepared by contacting a carrier with a copper ammonium carbonate and reducing the catalytically-active copper moiety to its active copper form. Bartley is not directed to copper electroplating as asserted by the Examiner.

Bartley is non-analogous art and cannot be properly cited against the claimed invention. The Federal Circuit in *In re Clay*, 23 USPQ2d 1058, 1060 (Fed. Cir. 1992) outlined two criteria for determining whether prior art is analogous:

(1) whether the art is from the same field of endeavor, regardless of the problem addressed, and

(2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.

Bartley is not from the same field of endeavor. It is directed to preparing a catalyst, and not to a copper electroplating material adapted to be fed as a copper ion supply to a copper plating bath in copper electroplating. There is no disclosure, let alone a suggestion, that the copper material disclosed by Bartley can be used as an electroplating material or adapted to used to as a feed material for supplying copper ions in a copper plating bath as required by claim 1.

Furthermore, the Examiner has not explained how the teachings of Bartley are reasonably pertinent to the particular problem solved by Applicant. Bartley teaches forming a copper catalyst by impregnating a carrier with a copper ammonium carbonate complex, drying the impregnated carrier, driving off the ammonia to form cupric carbonate and then calcining the cupric carbonate to form copper oxide and reducing the oxide to form the active copper catalyst (col. 6, lines 52-62). The problem Applicant seeks to solve is to reduce the impurities resulting from copper carbonate as a source material for replenishing copper ions in an electroplating bath. The Bartley patent does not disclose, let alone suggest, that the use of the use of a carbonate complex and the subsequent reduction to copper carbonate and calcining to copper oxide results in reducing impurities in the copper electroplating material as required by claim 1.

For all of the foregoing reasons, Bartley is non-analogous art and it cannot be properly cited against the claimed invention.

The Examiner concedes that Bartley does not teach supplying basic copper carbonate powder into a heating furnace and relies on Okada as teaching that "calcination can be conducted in

any ordinary calcining apparatus comprising an electric furnace (col. 3, lines 28-34).” Okada does to make up for the deficiencies of Bartley. Okada et al., like Bartley, is non-analogous art. Okada et al. patent is directed to preparing a spinel type compound that can be used as a catalyst. The patent is not directed to the same field of endeavor as the present invention, i.e., electroplating of copper. The Examiner has not explained how the teachings of Okada et al. are reasonably pertinent to the particular problem solved by Applicant. Okada et al. wants to make a porous spinel type oxide having large surface areas and a uniform micro-porous structure. Applicants method is directed to preparing a copper oxide powder having reduced impurities for use as a source for replenishing copper ions to a copper electroplating bath. That is the opposite of the endeavor of Okada et al. which is to form a porous free standing structure, not a powder. For all of the foregoing reasons, Okada et al. is non-analogous art.

Because both Bartley and Okada et al. are non-analogous art, it is improper to combine them and to conclude that “the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made” as asserted by the Examiner.

The Examiner relies on Fernandez et al. as teaching that “impurities or residues would have been present to a certain degree [in copper oxide] and it would have been desirable to the artisan to have removed them to obtain a purer product for further use.” Fernandez et al. discloses, in pertinent part, at col. 7, line 65 to col. 8, line 4 the following:

The copper ... [oxide is] conveniently precipitated by treating a soluble salt of [copper] ..., such as the sulfate or nitrate, with an alkali metal hydroxide. The [precipitate is] washed with water to remove soluble salts, including any excess alkali”

This disclosure in Fernandez et al. does not related to removing impurities, but only removing “soluble salts.” These “soluble salts” have not been characterized by Fernandez et al. as being impurities, let alone impurities that would be deleterious to a copper electroplating solution. Furthermore, the reference does not disclose forming the oxide from copper carbonate or forming a copper oxide powder.

Fernandez et al., like Bartley and Okada et al., is also directed to non-analogous art. The process disclosed in Fernandez et al. is not directed an electroplating process or to reducing impurities in copper oxide powder adapted to be fed as a copper ion supply to an copper electroplating bath. Fernandez et al. is directed to reducing the content in saturated fluorohalocarbons and fluorohalohydrocarbons by contacting the hydrocarbons with dry cupric oxide prepared from copper carbonate. There is no teaching in Fernandez et al. that a copper carbonate with impurities is reduced to form copper oxide as required by claim 1.

For all of the foregoing reasons, the rejection of claim1 under 35 U.S.C. § 103(a) as being unpatentable since the combining of the teachings of Bartley, Okada et al. and Fernandez et al. is improper because each of the references are directed to non-analogous art and since the combined teachings of the references fail to establish a *prima facie* case of obviousness. Accordingly, it is respectfully requested that the rejection of claim 1 over the Bartley, Okada et al. and Fernandez et al. be reconsidered and withdrawn.

Rejection of Claim 2 Under 35 U.S.C. § 103(a)

Claim 2 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Bartley (U.S. Patent No. 4,677,234) in combination with Fernandez et al. (U.S. Patent No. 5,449,845). The

reasons set forth by the Examiner are similar to those set forth above with respect to the rejection of claim 1 under 35 U.S.C. § 103(a). For reasons discussed *supra*, the Bartley and Fernandez et al. patents are directed to non-analogous art and the arguments traversing the rejection of claim 1 under 35 U.S.C. § 103(a) are incorporated herein by reference.

According to the Examiner, “Bartley teaches a method for manufacturing a copper electroplating material adapted to be fed as a copper ion supply to a copper plating bath in copper electroplating comprising the step of: heating basic copper carbonate powder (col. 6, lines 59-62) to a temperature of 250°C to 800°C (= from about 200°C to about 500°C) [col. 7, lines 40-46] in an atmosphere which is not rendered reductive to carry out thermal decomposition of the basic copper carbonate (= calcination involves high temperature heating under oxidizing conditions so that the carbonate is decomposed and the volatile material is expelled) [col. 7, lines 33-40], to thereby produce easily dissolved copper oxide powder (= conversion of carbon carbonate to copper oxide) [col. 7, lines 43-44].” As discussed *supra*, Bartley is not directed to the electroplating art and is non-analogous art.

The Examiner concedes that “Bartley does not teach washing the easily dissolved copper oxide powder with water to reduce the impurities which in the basis copper carbonate powder from the easily dissolved copper oxide powder to provide the copper electroplating material.” For this deficiency, the Examiner relies on Fernandez et al. as teaching a step of “washing a copper oxide precipitate with water to remove soluble salts, including any excess alkali (col. 7, line 68 to col. 8, line 1).” As discussed with respect to the rejection of claim 1, the process disclosed in Fernandez et al. is not directed to reducing impurities in copper oxide powder adapted to be fed as a copper ion

supply to an copper electroplating bath. Fernandez et al. is directed to reducing the content in saturated fluorohalocarbons and fluorohalohydrocarbons by contacting the hydrocarbons with dry cupric oxide prepared from copper carbonate. There is no teaching in Fernandez et al. that a copper carbonate with impurities is reduced to form copper oxide that can be washed with water to reduce impurities that can be deleterious to copper electroplating solutions.

The Examiner concludes that “the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Bartley by washing the easily dissolved copper oxide powder with water to reduce the impurities which in the basis copper carbonate powder from the easily dissolved copper oxide powder to provide the copper electroplating material because this would have removed residues as taught by Fernandez (col. 7, line 68 to col. 8, line 69)” and that “it appears that when preparing copper oxide (Fernandez, col. 7, lines 5-12 and lines 56-66; and col. 8, lines 38-53), impurities or residues would have been present to a certain degree and it would have been desirable to the artisan to have removed them to obtain a purer product for further use (col. 9, lines 15-26).” Applicant respectfully disagrees with this conclusion.

Both Bartley and Fernandez et al. are directed to non-analogous art for reasons set forth in the arguments traversing the rejection of claim 1. Moreover, a person having ordinary skill in the art would not have arrived at the claimed invention by combining Bartley and Fernandez et al. Bartley is making a hydrogenation catalyst of copper which is made by decomposing cupric carbonate to copper oxide and reducing the copper oxide to copper, while the copper oxide formed by Fernandez et al. is not prepared by decomposing cupric carbonate, but by reacting a copper

sulfate or nitrate salt with an alkali hydroxide. These methods are separate and distinct. There is no disclosure in Bartley that a copper oxide powder is formed. The copper oxide formed by Bartley is in a carrier. A person having ordinary skill in the art would not have washed the copper oxide formed by Bartley because doing so would in all likelihood would remove the copper oxide from the carrier. In doing so, the active copper catalyst could not be formed on and within the carrier and would render Bartley's process inoperable. Therefore, such a person would not have been motivated to modify Bartley as suggested by the Examiner. In addition, there is no teaching in Fernandez et al. that washing a copper oxide formed from a cupric carbonate will wash away impurities present in the carbonate that can be deleterious to the catalytic activity desired by Bartley.

For all of the foregoing reasons, the rejection of claim 2 under 35 U.S.C. § 103(a) as being unpatentable because the combining of the teachings of Bartley and Fernandez et al. is improper because the references are directed to non-analogous art and because the combined teachings of the references fail to establish a *prima facie* case of obviousness and would not have led a person having ordinary skill in the art to the claimed invention. Accordingly, it is respectfully requested that the rejection of claim 2 over the Bartley and Fernandez et al. be reconsidered and withdrawn.

Rejections of Claim 3 Under 35 U.S.C. § 103(a)

Claim 3 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Bartley (U.S. Patent No. 4,677,234) in combination with Okada et al. (U.S. Patent No. 6,218,335) and Fernandez et al. (U.S. Patent No. 5,449,845) as applied to claim 1 above, and further in view of Gottfried et al. (U.S. Patent No. 4,659,555). Also, claim 3 stands rejected under 35 U.S.C. 103(a) as being

unpatentable over as Bartley in combination with Fernandez et al. applied to claim 2 above, and further in view of Gottfried et al..

The arguments traversing the rejection of claim 1, *supra*, with respect to Bartley, Okada et al. and Fernandez et al. and traversing the rejection of claim 2, *supra*, with respect to Bartley and Fernandez et al., are incorporated herein by reference. Bartley, Okada et al. and Fernandez et al are directed to non-analogous art as discussed *supra*. In addition, the teachings of Gottfried et al. do not make up for the deficiencies of Bartley, Okada et al. and Fernandez et al.

In both rejections according to the Examiner, "Bartley does not teach wherein the basic copper carbonate is obtained by mixing an aqueous solution of a copper salt selected from the group consisting of copper chloride, copper sulfate and copper nitrate and an aqueous solution of a carbonate of a material selected from the group consisting of alkaline metal, alkaline earth metal and ammonia (NH_4) with each other, reacting both aqueous solutions with each other while heating them, to thereby deposit a reaction product, and separating the reaction product by filtration." For this deficiency, the Examiner relies on Gottfried et al.

In both rejections according to the Examiner, "Gottfried teaches a process for preparing basic copper carbonated comprising the steps of: (a) mixing an aqueous solution of a copper salt selected from the group consisting of copper chloride, copper sulfate and copper nitrate (= a waste solution from copper etching processes of CuCl_2) and an aqueous solution of carbonate of a material selected from alkaline metal, alkaline earth metal and ammonia (NN_4) (= sodium carbonate solution) with each other; and (b) reacting both aqueous solutions with each other while heating them (= a temperature of 60°C), to thereby deposit a reaction product (= basic copper carbonate as a

light green precipitated sludge), and separating the reaction product by filtration (filtered, washed and dried) [col. 2, line 56 to col. 3, line 6]. “

From these teachings, the Examiner concludes that “the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Bartley with wherein the basic copper carbonate is obtained by mixing an aqueous solution of a copper salt selected from the group consisting of copper chloride, copper sulfate and copper nitrate and an aqueous solution of carbonate of a material selected from alkaline metal, alkaline earth metal and ammonia (NH₄) with each other, reacting both aqueous solutions with each other while heating them, to thereby deposit a reaction product, and separating the reaction product by filtration because Bartley is silent as to how the copper carbonate is obtained” and that “it is well within the skill of the artisan to obtain the copper carbonate by the process disclosed by Gottfried (col. 2, line 56 to col. 3, line 6) because the basic copper carbonate so obtained is particularly suitable as a feed additive and for the preparation of catalysts as taught by Gottfried (col. 2, lines 49-51).” Applicant respectfully traverses this rejection.

The rejection is improper because Bartley, Okada et al. and Fernandez et al. are directed to non-analogous art as set forth, *supra*, and Gottfried does not make up for the deficiencies of Bartley, Okada et al. and Fernandez et al. As pointed out by the Examiner, Gottfried et al. disclose a process for preparing copper carbonate by mixing a waste solution from a copper etching process with an alkali carbonate solution that already contains basic copper carbonate in suspended form (col. 2, lines 26-29). Taking Gottfried et al. alone or in combination with Bartley, Okada et al. and Fernandez et al, there is no suggestion that the copper carbonate formed contains unwanted

impurities that would be deleterious in an electroplating bath. Furthermore, Gottfried et al. do not disclose reducing the carbonate to form a copper oxide powder and subsequently washing the oxide with water to reduce the amount of such impurities as required by claim 3. Moreover, while Gottfried et al. disclose that the basic copper carbonate obtained is particularly suitable as a feed additive and for the preparation of catalysts, the reference does not disclose or suggest reducing copper carbonate to a copper oxide and washing the copper oxide to reduce impurities and using the washed copper oxide as a feed for supplying and/or replenishing copper ions in a copper electroplating bath as required by claim 3.

For all of the foregoing reasons, the rejections of claim 3 under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings of the prior art relied upon by the Examiner is improper because Bartley, Okada et al. and Fernandez et al. are directed to non-analogous art and because the combined teachings of the references relied upon by the Examiner fail to establish a *prima facie* case of obviousness. Accordingly, it is respectfully requested that the rejections of claim 3 be reconsidered and withdrawn.

Conclusion

For the foregoing reasons, it is submitted that the claims 1-3 are patentable over the teachings of the prior art relied upon by the Examiner. Accordingly, favorable reconsideration of the claims is requested in light of the preceding amendments and remarks. Allowance of the claims is courteously solicited.

Application No.: 09/944,344

If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due under 37 C.F.R. § 1.17 and in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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